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ABSTRACT

Online teaching technologies still have three main disadvantages: cost, complexity, and negative impacts on productivity. In many areas of Canada, cost is still a major factor affecting ownership and use of computers and other new technologies. Until online teaching technologies become as simple to use as telephones and new cars, they will continue to fail to produce productivity increases. The Internet illustrates how online teaching technologies have been a mixed blessing. The Internet's potential advantages as a teaching tool stem from the fact that it is engrossing and inherently interesting, incorporates multi-sensory uses of media, provides enormous numbers of connections to other sources of information and interaction, allows everyone an individualized experience, and can both reflect and be a creation of teachers and learners. However, these same characteristics also account for some of the Internet's major weaknesses as a teaching tool. Any plan to use the Internet and other new technologies as teaching tools must begin with a quality-oriented assessment of the given technology's fitness for use as a teaching tool. Factors to consider include whether the technology is directly related to the learning outcomes of specific audiences of learners, affordable, readily accessible to local users, and durable and long-lasting. (MN)

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ACHIEVING QUALITY WITH ONLINE TEACHING TECHNOLOGIES

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ACHIEVING QUALITY WITH ONLINE TEACHING TECHNOLOGIES

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Introduction

What I would like to talk about this morning is related to the theme of this conference: the challenge and problem of quality as it applies to education and training using the technologies we now have available to us. I want to offer some observations about where I think we are now with this challenge, and in the process I hope to make some modest proposals for changes to our current practices that might help us achieve a better quality learning experience for all.

I approach this topic from the point of view of someone who uses technology constantly, in my job as a distance education instructor at Athabasca University, and as the father of four sons, one of whom is an electrical engineer. I make no special claims in this - as I will discuss later, many Canadians spend huge amounts of time in the cyber-

world, and anyone with kids will be faced with their children's involvement in technology in school and through their friends.

The theme of my remarks is this: While I work constantly with and through technology, I remain skeptical that we have the answers about its uses and its requirements. I approach my topic this morning from the point of view of someone who would like technology to do more, better, and cheaper and more cost-effectively. Faster doesn't concern me, really, except that I spend a lot of time I resent on making these damn things work – a point I want to return to shortly as part of the discussion of productivity and cost-effectiveness with these tools.

Where are we now?

What can we say with confidence about what technology has done for us so far, especially as a helper in education and training environments?

We have been led to believe that we should expect a lot. As long ago as 1979 one writer predicted that no field of human endeavour would be exempt from the impact of the personal computer. In 1994 another predicted a "revolution" in higher education, which "will carry untold benefits for those willing to invest the money, resources and time" to achieve them (p. 166). Recently we have been hearing the term "re-engineering" in relation to education, but one critic uses the term in relation to "[bringing] down the

schoolhouse walls" (p. 2). Finally, someone has ominously echoed Trotsky on war in relation to technology ("You may not be interested in technology, but technology is interested in you" [p. 25]).

Have these predictions actually been realized? Let's get the major downsides of technology on the table right away, and see whether there seems any plausible way to reform them. These are, I think (and here I agree with Tony, who has written on these issues):

- Cost
- Complexity
- Impacts (especially negative) on productivity

There are other problems, but the others are related to the above, so let's examine these further.

Cost

Technology, especially computer technology, continues to be expensive, not just to acquire but to care for and feed. A typical computer system today will cost $1600 - $2500, depending on the bells and whistles, and operating costs begin to count up almost immediately after purchase. Applications and programs need to be added, as most

systems come with only a few games and Windows. (I am talking about the 90%+ computers that are not Macs.) To be specific, Statistics Canada reports average spending in Canada in 1998 (for those reporting any expenditures) of $1000 for computer and related equipment.

Some users – but by no means all, as we shall see shortly – will also add Internet access, with the hardware and operating costs associated with that decision. In this respect, and to put this into perspective, we are fortunate: Internet access in Canada is among the lowest cost anywhere in the world, even lower than the US, because we tend to have reliable and stable providers, while an ISP glut in the rest of the world has resulted in near-chaos as mergers and bankruptcies sweep through some countries, and our telephone services are, by world standards, reliable and very cheap. But it is still an additional cost to purchase this connection, even if an additional phone line is not added to the cost. Statistics Canada reported an additional average expense of $242 for Internet access in 1998.

Another *real* headache in costs comes after the typical buyer brings his system home and uses it for a time. The headache is called *upgrades*. Unlike some purchases (car, washer and dryer, TV) computers and their components become obsolete rapidly, and are not only unsatisfactory after a while, they may not work at all. Many parents had the sobering realizing in the 1990s that RAM and faster CD-ROM units were required

(along with the software designed to exploit them), and that their recently purchased system had to go regularly back into the shop for these enhancements.

The cost of many of the current computer-based technologies is clearly related to ownership patterns in Canada. Here is a table showing current ranking of ownership by geographic region:

Province	Rank
Newfoundland	8
P.E.I.	6
Nova Scotia	4
New Brunswick	10
Quebec	9
Ontario	3
Manitoba	5
Saskatchewan	7
Alberta	1
B.C.	2

This pattern reflects growth in absolute terms, as the following table shows, but it is difficult to avoid the impression that there are increasingly "user" and "non-user" regions of the country. As someone who works in an organization which assumes clients will have and know how to use these technologies, this is a course of concern.

The overall Canadian ownership situation of computers and related access devices looks like this:

	1996[1]	1997[2]	1998[2]
- Computer in home	31.6%	39.8%	45.1%
- Modem in home	15.5	25.0	32.0
- Home Internet access	7.4	17.2	24.8
- At least one regular user[3]			30.0

[1]Dickinson & Sciadas, 1997.
[2]"Selected dwelling characteristics," 1999.
[3]"Getting connected, staying unplugged," 1999.

By comparison, the US average for Internet access is about the same, but with variations from over 44% in Alaska to less than 15% in Arkansas. There, as here, the impression is clear that, like the telephone, the automobile and the TV were historically, computer access and computer-based communications capabilities are a sign of socioeconomic privilege.

Complexity & productivity

Complexity is a relative point, I admit, but the standard according to one observer is simple: the telephone. He maintains that until computer-based communications are as easy and friendly to use as a telephone the computer will continue to be regarded as exotic.

The question of what constitutes a "convenient" technology is historically an interesting one, and other technologies show how the standard can change and evolve.

For example, when the automobile first appeared a researcher (probably an academic) observed that its future was stellar, only limited, as far as he could see, by the availability of chauffeurs. In the early days of telephone service the major limitation to expansion of the Bell system was the supply of young women to serve as operators. In fact, it was predicted that every employable woman between the ages of 18 and 23 would be needed as an operator is the system were to meet the demand projected for it.

Both those technologies solved their access problems by removing the need for the "operator" level of intervention. By becoming more friendly and less complex, the product became ubiquitous. The computer has not yet done that. The computer has not increased access by reducing complexity, but rather has forced users to increase the involvement with and access to its innards, to spend more time grappling with the complexity of the machine. The result is an appalling failure of productivity with these new technologies, a scandal which is only now becoming visible. What has happened has been the equivalent of requiring every owner of a phone or a car to become a practicing mechanic and working telephone technician. And *practicing* and *working* are the key words here, because the time requirement is not trivial.

Analysts looking at the situation have come to conclusions such as "computers are basically a dud in terms of productivity growth," and there is "little connection between information technology investment and profits, growth, or productivity" in the private sector.

The problem is that the machines themselves are too complicated, they require too much care and attention, and, most especially and somewhat ironically the main problem is that the *users can do the maintenance themselves*. And they do so, with a vengeance. Consider the phenomenon of the **futz factor**. How often do you make changes, adjustments, enhancements, repairs, improvements, etc. – call it what you will, including, as some critics do, *futzing* – with your computer? Include both the obligatory antivirus downloads, as well as the upgrades and other fiddley things they seem so regularly to require. Now imagine having to do the same kinds of things with the same frequency to your car, your phone, your major household appliances, etc.

Until technology becomes as simple and as handsfree as a telephone or a new car, it will continue to fail to produce productivity increases. Indeed, as a consequence of the futz factor (people spending an hour experimenting with different wallpaper for their desktop, or browsing the net) productivity will be positively damaged by greater usage of some technologies. No wonder a recent StatsCanada study found that the technology which had had the most positive impact on productivity in the previous decade was the fax machine.

My point is that, if cars required this same amount of futzing, a) that there would be a mutiny of refusal over the incredible amount of lost time which would result, and an accompanying demand for simpler machines, and b) that meanwhile, the highways would be littered with the breakdowns of those who decided to give it a try, ultimately unsuccessfully.

It *is* possible to have productivity increases with technology, of course, but not the way we usually try to do in education and training, which is by replacing one of our present functions with a similar function performed by a machine. This is the ATM model, where instead of a person counting your money, handing it to you, and adjusting the balance in your account, a machine does it. There are some jobs that can follow the ATM model. These tend to have two characteristics:

- their real business is the repeated execution of basically the same simple task, usually consulting a database of objective information, reporting the results back, and updating the database if the customer decides to buy something from it; and

- their financial viability is dependent upon the volume of transactions per cost centre in a unit of time.

The industries which fit the ATM model include insurance, travel, finance and accounting, recordkeeping and inventory, and some aspects of wholesaling. Interestingly, there are elements of the above in teaching and training, too, which has led some technology enthusiasts to try to apply technology throughout the teaching and learning environment. The failure is in recognizing the repetitive and merely clerical aspects of teaching (such as building and maintaining testbanks, or administering exams,

or keeping required records) from the intuitive and highly individual tasks of which teaching is mainly composed, which are mainly not amenable to automation.

But there are many other which cannot operate on the ATM model because their business is based on complex **performance** measures, not volume or simply database transactions. You can tell the difference by asking "Are you impressed by reports of the ***number*** of customers served in a given time period, or must the number of customers served and the time required to do so be expected to vary according to the individual needs of the customers"? A surgeon, or a teacher, for example, who claimed quality based on the volume of his or her transactions or customers would be avoided like the plague he would probably be. A courier service or an airline, on the other hand, could well brag about the number of their clients, since the number is presumably only related to satisfaction.

The problem of structure with technology: the Internet

The Internet is a wonderful creation for many purposes. It is not an unmixed blessing, however.

The Internet offers several potential advantages as a teaching tool, including:

- It is engrossing and interesting inherently.

- It incorporates multisensory uses of media.

- It provides enormous numbers of connections to other sources of information and interaction.

- It allows everyone an individualized experience.

- It can reflect and be a creation of teachers and learners, incorporating whatever they wish to put into it.

Not surprisingly, these same characteristics also account for some of the Internet's major weaknesses as a teaching tool:

Engrossing. The engrossing elements may not be the educational ones - or not the educational ones we want. This same aspect can lead to addictive behaviour among susceptible individuals. One survey of 18,000 users conducted in 1998 found that 6% would be regarded as seriously addicted to the Internet, while another 10% would be regarded as "abusers." These conclusions were based on amounts of time spent online, intensity, compulsiveness, secrecy of use, and consequences for relationships. This usage also includes *irritainment*, stuff we wish we weren't looking at but can't seem to ignore.

How serious is this problem?

- Employees in 1997 reported spending an average of 90 minutes per day visiting sites *unrelated to their jobs.*

- A study done by another firm showed that employees at 62% of the companies surveyed accessed sexually explicit Websites at work.

- Sites such as *Weather Channel*, *Amazon.com*, *Broadcast.com*, and, especially, *eBay* are heavily used from worksites - far more, in the view of the study's authors, than could possibly be related to **work** itself. (Some employers have expressly filtered eBay from their worksite systems because of its notorious reputation for luring workers.)

- Even potentially legitimate sites are accessed on company time: a survey of visits to the U.S. Treasury Department site in February found that 2 out of every 5 came from a worksite.

I will have more comments shortly about some of the educational implications of these facts.

Some other problems include:

Visual multimedia applications. Multimedia applications, while stunning in some environments, impose enormous limitations on availability to users. Bandwidth, processor speed, minimum hardware requirements – all become limitations on users. Programmers often fail to take these limitations into account, and the resulting time and expense of downloading these "shows" often fails to be justified based on their impact. Instructional design simply disappears in the glitz.

The number and variety of connections is a potential trap for the unprepared. Making decisions about which connections are worth exploring is not one which novices typically make successfully, without help. The *Library Journal* makes the following observation about the Internet as an information source:

> The net is like a huge vandalized library. Someone has destroyed the catalogue and removed the front matter, indexes, etc., from hundreds of thousands of books and torn and scattered what remains ... and the walls are covered with graffiti. . . The Net is even worse than a vandalized library because thousands of additional unorganized fragments are added daily by the myriad cranks, sages, and persons with time on their hands who launch their unfiltered messages into cyberspace (*Library Journal*).

The individualized experience provided by the Internet, like the huge number of connections, is two-edged. The chief problem is simply getting lost in cyberspace, and wandering aimlessly around among the displays (but not necessarily unhappily- see the

previous comments above about the Internet's capacity to engross). For the same reason that libraries are not schools, vast arrays of information are not instructive - without structure.

Finally, **the fact that anyone, including teachers and students, can put things into the Internet without review or evaluation** produces the "unorganized fragments" mentioned earlier. It also accounts for the many examples of poor design and amateurish development routinely seen. (Programmers call this "dancing baloney," or worse, especially when it appears in the work of non-professionals.) But the most serious problem from the teaching standpoint is the questionable nature of the information often presented in the Internet environment. There is just no possible way to judge the accuracy or provenance of information on the net, unless someone (the teacher) goes there first and assesses it. Students are not in a position to do this for themselves, and the damage can be incalculable if they are misled by false, one-sided or otherwise distorted opinion passing as objective truth.

Structure and learning

The concept of structure may not have been adequately appreciated by proficient technology users, especially those who are also proficient self-directed learners. Those of us who do not require a great deal of outside structure, who are autonomous and self-

directed, tend to forget how we got that way. We tend to minimize or ignore the needs of those who do not have the skills yet to provide their own structured learning space.

Recall your EdC&I 101 definition of teaching: arranging conditions so learning can occur. How and whether we do this distinguishes schools from libraries or other relatively unstructured aggregations of information. The Internet, is true of all online environments, requires a lot of this, but it doesn't always receive it.

The problem of lack of structure is not limited to learning situations, either, nor does the problem of controlling uses made of this resource end when school ends. In addition to the figures already presented, consider a 1999 study of 6,500 workers which found:

- Workers averaged 21 hours of online activity not related to work, using the employers (usually) faster Internet access.

- About 12% of users accessed pornographic sites from work, about half the number who did so from home.

- Only one in ten employees in a survey of 1,244 workers felt using the Web for non-work reasons was unethical. Another study found that workers who were in high pressure work environments thought Internet use was a perk of their jobs.

- Sixteen percent said they never sent personal e-mails from work. (Of the majority who admitted doing so, the confessed range of activity was from one to over twenty messages per day.)

- Consistent with the first finding, about three-quarters denied they took special precautions to avoid detection when doing personal business from work.

- According to another survey, one-fifth of computer gamesplayers also play at least occasionally from the workplace, when they are presumed to be working

- Interestingly, forty percent of supervisors and employers surveyed (n = 1,438) felt that up to a half hour per day was permissible, and 4% felt up to an hour per day was not excessive, either for personal e-mail or surfing activities.

- As many as seventy percent of employers do not have policies on non-work related use of computer facilities, but this may be changing as the problems related to unauthorized use of the Internet from worksites seem to be getting worse.

- The problem has become so serious that a new term has been coined for employees who abuse their computer privileges: *cyberslackers.* Campbell reports that over the previous year the cost of computer resources tied up

supporting such activities was over a billion dollars, with the cost of lost productivity of workers additional to that. Both figures are estimated to be twice what they were in the previous year.

- There are also shopping, news service and employment related Websites which cater to cyberslackers, and one cleverly, if brazenly, is called *ishouldbeworking.com*.

The last word probably has to be Roszak's, who puts the situation nicely with this metaphor:

> The Internet is a free-for-all as enjoyable as any conversation one might strike up in a saloon or coffee house. But it is hardly governed by the critical safeguards and intellectual structures that have been developed across the centuries to discriminate between honest thought and rampant eccentricity.

Neither a coffee-house nor a library is a school - though admittedly both can produce learning. The point is that the function of school - of "formal education" - is to structure the environment so that the maximum number of students can succeed. The Internet, which potentially capable of helping, is not ready to do so out of the box.

Enhancing the quality of technology-based learning

This talk is about quality, and how to increase it in our uses of technology in teaching and training. I would like to talk about the prospects for greater quality now, and to begin this part of the discussion with a definition.

I like to define quality as simply *fitness for use*. I like this concept because it makes the quality of any object or process dependent upon the results it achieves. Sometimes we think of quality is a characteristic of things, but a little reflection makes it clear how much circumstances intrude. For example, a Corvette makes a poor machine for delivering newspapers, and, as I have constantly had to remind my sons, a wood chisel makes a poor screwdriver. On the other hand, a tool in the hands of a craftsman, used for the purpose for which it was designed, produces quality – because it is fit for the use it is put to.

If quality is the goal in education and training uses of technology, the standard of fitness for use for teaching and training should be primary. This sounds common-sensical but it is often ignored by programmers who delight in demonstrating their proficiency, or the capabilities of the medium, without much attention to the impacts on learning per se. In fact, at one time it was common to hear the question, "Is this the best use of this medium?", meaning is this the best use of the capabilities of this technology for various interaction, display or recordkeeping activities. As if the technology cared whether it was being used to its full potential. (One is reminded, if I don't date myself

too badly here, of the comment of HAL in the Kubrick's *2001*, that he felt fully employed and useful in his role. For those of you who don't remember the movie, he eventually ends up killing most of the human members of the crew because of a bout of digital paranoia, or something.)

What makes a technology fit for teaching? Again, the use determines this, not the technology itself. In some areas or jurisdictions, where reliable power or affordable bandwidth are lacking, the standard might be what other would call "low-tech": battery-powered tape recorders, print, battery-powered wordprocessors, and other local (non-networked) forms. In other areas, the standard might be the highest and most cutting edge technologies, because of the capacities of the users to benefit, and the infrastructure to support them.

The point is this: In order for a tool to be fit for use for teaching it must work. What constitutes such a technology must depend upon the local scene, but there are some guides.

Bloom (1984) has identified what he calls the "alterable variables" of learning, which he gives as:

1. Tutorial instruction
2. Reinforcement
3. Corrective feedback

4. Cues and explanations
5. Student participation
6. Time on task
7. Reading and study skills

Any technology implementation should begin with a question about which of the above variables it will alter, and how all parties will know the results were as planned. (Evaluation and accompanying accountability are notoriously weak in technology implementations.) It should also begin with recognition that, as media research as repeatedly shown, all technologies seem to have the same *inherent* ability to produce learning (the famous *no significant difference* phenomenon).

There are some other requirements for technology use to comprise quality. I will hazard a guess about what a survey of useful and impactful technologies for teaching and learning might reveal about their inherent characteristics. I would suspect these technologies would be inherently:

- Directly related to variables which, in turn, are demonstrably related to the learning outcomes of *specific* audiences of learners.
- Affordable.
- Readily and conveniently accessible to local users.
- Durable and long-lasting (robust).

What technologies are up to this standard today?

Print, certainly. Nothing worth knowing or having fails to find its way onto paper, sooner or later. Watch students in a computer lab and you will see them printing the important bits and filing them. What they later do with them is debatable, but the fact that the material is printed lends a permanence, familiarity and portability which is not found in online materials.

The problem of who prints, and what form the printed material takes, is an important and sometimes neglected one. I am involved in a training project at the moment with a university in Vermont. They have chosen to take the materials we supplied and mount them on their Internet server. Students are required to download and print the materials, if they want them, themselves. The result is that, first, not all the students are doing so, for various reasons related or their capabilities or equipment, not to mention time; and second, that the materials are in different formats, with differing fonts and pagination, depending upon the systems used. We have lost control over the form the materials have, and are unable to do simple things like refer to page numbers for materials.

Print is more than text: print is text which has been structured in some formal way to make it more usable by the desired audience. The structure of print is part of its meaning, a form of communication, and responsible for the impact and utility of the text. The importance of this fact must not be minimized, and can be tested and demonstrated

by taking a piece of text and printing it in block format, without variation in font or even paragraphing. All that is missing is the format, but what is lacking is the usefulness of the result.

Audio presents the problem of whether we want - or our students need - real-time interaction (synchronous, in the distance education jargon) or whether asynchronous, digitized or taped exchanges are sufficient. Audioteleconferencing and Internet-based audio are available, but are synchronous, and impose inconvenience and inflexibility on students which recorded, asynchronous versions do not. We claim that the interaction available in synchronous exchanges makes them educationally more valid, but it remains to be seen whether we are actually providing those opportunities in our classrooms.

The same problem besets **video**, where the expense is also greater for providing real-time synchronous interaction, especially if the video is 2-way as well as the audio. Again, is the educational benefit there? Do we have evidence that students derive enough benefit form seeing us, and we them, to make this relatively experience and inflexible technology our mainstay?

A recent survey of US postsecondary institutions identified the major choices of technology in US postsecondary institutions. The top 3 technologies of choice in 1997 and 1999 (nothing else was used in more than 19% of institutions) were:

	1997	1999
- Internet video	< 1%	60%
- 2-way interactive (synchronous) video	57	56
- 1-way pre-recorded video	52	48

Several things are striking about these data. The usefulness ("quality") of videocassettes seems to be recognized, but why the preponderance and meteoric growth of real-time, 2-way video? It is questionable whether the costs and inflexibilities of this medium justify its popularity. One writer says bluntly that asynchronous interactivity is sufficient for most purposes, that other factors like regular, convenient office hours, prompt feedback and peer interaction are more useful to students than synchronicity (though perhaps not to the instructor), and that "live" performances present "significant disadvantages" to learners. Sobering and difficult to dispute observations, yet video seems to be *the* technology of the next few years. Why?

Computer-based communications and interactions are beginning to be appreciated. We are now seeing that asynchronous CMC can provide the environment for understanding, interaction, and elaboration and negotiation of meaning that characterizes the best face-to-face learning environments, but which is often lost in the translation to mediated environments.

What is still missing in our uses, though, is an understanding of the phenomenon of **asocial interaction,** including lurking, flaming and rudeness, and of the actual role and responsibilities of the moderator. We have some convictions in these areas but our research has not kept up with the need to know more about how students interact with

these tools, and what our roles should be in assisting them. There are some promising projects underway, however, including some at my own institution, which should go some distance toward resolving these issues.

The exotic technologies (**satellite, ITV**, computer-assisted instruction, and computer-manager instruction, among other) continue to be minor players, basically because of cost, but also because they command more of the cognitive bandwidth of the organization. These technologies require a major re-commitment of energy to learning to use them, and imply a commitment to a certain style of delivery and philosophy of teaching and learning which all in an organization may not share. There is an old saying: "computer-assisted learning is the way of the future in learning – and it always will be." We have several technologies which might fall into this description

Conclusions

I think we will begin using technology more effectively in the near future, partially because the technologies will get easier to use, but mainly because we will start seeing them as tools. Just as we don't enthuse about every new development in cars, but tend to see them as contributing to a need or a problem we are already familiar with, we will start seeing teaching technologies as addressing needs.

The interesting question will be whether we apply a quality-oriented concern to these tools as tools. Will be define success – and quality – as a more fit-for-learning environment? Will the bar be set higher for dealing with individual needs, for being flexible, and for serving wider audiences? Will we recognize that technologies are not ends in themselves, and, especially, that they are not primarily for *us*, for making our teaching or training lives more fulfilled, but for students?

I hope so, especially since I don't see us spending less money on these things, or less time, either. We need more benefits, more obvious signs that what we're doing is paying off, in terms students can recognize – signs, that is, of quality in online learning design and practice.

References

Bloom, B.S. (1984). The 2 sigma problem: The search for methods of group instruction as effective as one-to-one tutoring. *Educational Researcher*, June-July, 4-16.

Dickinson, P. and Sciadas, G. (1997). Access to the information highway: The sequel. Analytical Paper Series, No. 13, Ottawa: Statistics Canada. (Publication #: 63F0002XPB.)

Getting connected, staying unplugged. (1999). *Innovation Analysis Bulletin, 1*(1), 4. Stastics Canada - Catalogue No. 88-003-XIE. Available: http://www.statcan.ca:80/english/freepub/88-003-XIE/free.htm .

Selected dwelling characteristics and household equipment. (1999). Source: Statistics Canada Internet Site, http://www.statcan.ca/english/Pgdb/People/Families/famili09c.htm .